BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

FLEXIBLE OUTSOLE

BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to footwear generally, and more specifically, to footwear having an outsole constructed to provide both stability and cushioning for the foot.

Background of the Invention

A child's shoe may serve a number of different functions. Many of these functions are the same as those performed by an adult's shoe. A child's shoe should, for example, protect the child's foot from the elements, and from potentially harmful objects that the child may step on. A shoe may also serve as a cushion to absorb the impact of small objects or sharp edges underfoot. The shoe should also provide support for the child's growing foot. This support function may include providing varying levels of support for different parts of the foot, e.g., greater support for the arch than for the heel. A shoe may also provide a stable platform to enable the child to walk steadily on irregular surfaces. Additionally, a shoe may act as a "shock absorber" as the child walks or jumps, to reduce stress on the foot, ankle and legs. A high-quality shoe that serves all of these functions therefore should provide support for various parts of the foot, provide a consistently stable platform for the child to walk on, cushion and protect the child's foot from small objects on the ground, and serve as a shock absorber.

Many children's shoes that are used today fail to provide one or more of the functions described above. For example, many existing children's shoes have outsoles made of a single, uniformly solid material. In many cases, a uniformly solid outsole may fail to provide an

appropriate level of support for certain parts of the foot, such as, e.g., the arch. A uniformly solid outsole may also fail to provide a stable platform for walking on irregular surfaces. For example, if a child steps on a pebble, the shoe may tilt to the side and cause the child to stumble or even twist his or her ankle. A shoe with a uniform, solid outsole may similarly fail to serve as a shock absorber; if the child jumps, the shoe may not protect his or her foot, ankle and leg from the impact of landing, and as a result the child may suffer fatigue, discomfort, injury, or a fall.

In addition to the functions described above, a good quality child's shoe should also serve to encourage a healthy pattern of growth and development of the child's foot. It is generally considered desirable for the development of a child's foot to allow the foot to move with as little external restriction as possible. Providing unrestricted freedom of movement to the foot enables the child to walk with a natural barefoot motion, which in turn facilitates proper growth and development. To allow the foot to move with a natural barefoot motion, or a close approximation thereof, a shoe must allow the foot and toes to bend in a natural manner while walking.

Unfortunately, many children's shoes that are used today are constricting and/or insufficiently flexible to allow the child's foot to move and bend in a natural manner. For example, as discussed above, many existing children's shoes have uniformly solid outsoles. Such outsoles are not sufficiently flexible to permit the foot to bend or flex in a natural manner while walking or running.

SUMMARY OF THE INVENTION

The present invention improves upon existing shoe technology by providing an outsole that offers stability, protection and cushioning for the foot, and is flexible to allow the foot to

move in a natural manner. Accordingly, in one embodiment, an outsole is provided that comprises a frame portion composed substantially of a first material that is relatively firm to provide stability to the outsole, and one or more insert portions molded to the frame portion. The one or more insert portions are composed substantially of a softer second material to provide a cushioning effect. In one embodiment, the outsole includes a ball-strike insert portion and a heel-strike insert portion.

In one embodiment, the surfaces of the one or more insert portions may include one or more hollow, molded cushioning modules. In one embodiment, each of the cushioning modules may be formed in a semispherical shape. In this embodiment, the ball-strike insert portion may also include a plurality of parallel, hollow molded ribs oriented perpendicular to the toe-to-heel direction of the outsole.

In one embodiment, the frame portion is composed substantially of a relatively firm thermal plastic resin (TPR), and the insert portions are composed substantially of a softer TPR. For example, the frame portion may be composed of a TPR having a durometer between 40 and 45, and the insert portions may be composed of a TPR having a durometer between 33 and 35.

In another aspect of the invention, a shoe is provided, comprising an upper, an insole board, and an outsole having attributes described above. In various embodiments, the outsole may be included in shoes for infants and for children up to eight years of age.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the invention will be apparent to those skilled in the art from the following detailed description of selected embodiments, taken together with the accompanying drawings, in which:

FIG. 1 illustrates a bottom view of an outsole, in accordance with an embodiment of the invention;

FIG. 2 illustrates a top view of the outsole of Fig. 1, in accordance with an embodiment of the invention;

FIG. 3 illustrates schematically a cross-section of the outsole of Fig. 1, in accordance with an embodiment of the invention; and

FIG. 4 illustrates a shoe that includes the outsole of Fig. 1, in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with a first aspect of the invention, an outsole is provided, comprising a frame portion and at least one insert cushioning portion. Fig. 1 illustrates a bottom view of an outsole 100 that comprises a frame portion 120 and two insert cushioning portions, including a ball-strike insert cushioning portion 270 and a heel-strike insert cushioning portion 280, in accordance with an embodiment of the invention. In this embodiment, the frame portion 120 comprises a peripheral edge area of the outsole 100 that surrounds insert cushioning portions 270 and 280. In this embodiment, the frame portion 120 also covers a part of the arch area 240 of the outsole 100. In alternative embodiments, the outsole may comprise only one insert cushioning portion, e.g., a ball-strike insert cushioning portion only, or alternatively, a single insert cushioning portion that covers the ball-strike region, the heel-strike region, and the arch area. In yet other embodiments, the outsole may comprise more than two insert cushioning portions.

In the illustrative embodiment of Fig. 1, the frame portion 120 and the insert cushioning portions 270 and 280 are constructed of two different materials of two different densities. In one embodiment, a first, relatively firm material is used for the frame portion 120 and a second, softer and more flexible material is used for the insert cushioning portions 270, 280. This configuration enables a child's foot to bend naturally and more easily to control the shoe. By providing freedom of movement, the outsole 100 facilitates the natural growth and development of the child's foot. In one embodiment, the frame portion 120 and the insert cushioning portions 270, 280 are molded together.

The frame portion 120 provides a stable support structure for the outsole 100, and thus provides stability for the child's foot as he or she walks. The frame portion 120 may also serve to protect the child's foot from small objects underfoot. In one embodiment, the frame portion 120 is constructed of a firm material with rounded edges to facilitate confidence in walking on carpeting. Rounded edges are desirable because a firm outsole without rounded edges may cause a child to stumble or trip when walking on carpeting.

In one embodiment, the frame portion 120 may be constructed of a light thermal plastic resin ("TPR") having a durometer between 40 and 45. In this embodiment, the insert cushioning portions 270, 280 may be constructed of a light TPR having a durometer between 33 and 35. It should be noted that the materials and specific durometer measurements given in this example are for illustrative purposes. Similarly, in other embodiments, materials having durometers different from those given above may be used.

The bottom surface of the frame portion 120 may additionally include a plurality of ribs and grooves at various locations on its surface to improve the flexibility and grip of the outsole 100. For example, in one embodiment, the surface of the frame portion 120 may incorporate a

plurality of parallel ribs in the toe and heel areas, and one or more grooves located at the sides of the ball-strike insert cushioning portion 270.

The insert cushioning portions 270, 280 provide protection and cushioning for the child's foot. For example, the insert cushioning portions 270, 280 may protect the child's foot from small objects that he or she may step on, and lessen the impact to the foot caused by such objects. Additionally, because the insert cushioning portions 270, 280 are composed of a soft, pliable material, they may act as a "shock absorber" as the child walks or jumps, absorbing the child's weight when his or her foot contacts the ground.

In the illustrative embodiment of Fig. 1, the surfaces of the insert cushioning portions 270, 280 include a plurality of hollow molded modules or pods 276. In this embodiment, the modules 276 form an integral part of the respective surfaces of the insert cushioning portions 270 and 280.

In this embodiment, each module 276 has a hollow semispherical shape and has a hollow, air-filled interior. Accordingly, each module creates an independent cushioning area, yet, at the same time, the modules 276 work together as a unit to assure stability. The framework (flat surface area) between the modules provides additional stability. It should be noted that although in this example the modules 276 are semispherical in shape, in alternative embodiments the modules 276 may be have other shapes, including, for example, ovals, diamonds, flattened pyramids, etc.

The arrangement of the modules 276 protects the foot from bruises to the foot when stepping on small stones or other irregularities in the walking surface. For example, if the child steps on a small object such as a pebble, an individual module, or several adjacent modules, may absorb the impact from the pebble without affecting the overall stability of the outsole 100 (e.g.,

without causing the shoe to tilt to one side), reducing or eliminating any pain or discomfort that may be sustained by the child's foot.

In one embodiment, the modules 276 are arranged in a regular pattern on the surface of each insert cushioning portion 270, 280. In this embodiment, each module 276 has a diameter of 9 millimeters and a wall thickness of 1.5 millimeter. In this embodiment, the modules 276 are positioned tangentially to one another (i.e., each module is in contact with the edge of one or more adjacent modules). It should be noted that the measurements of diameter, wall thickness, etc. given in this example are for illustrative purposes. In alternative embodiments, the modules 276 may have other sizes and arrangements. For example, in an alternative embodiment, additional space may be provided between the modules 276 so that the modules are more spaced apart and not in contact with each other.

In the illustrative embodiment shown in Fig. 1, the insert cushioning portion 270 further comprises a ribbed or slotted area comprising a plurality of hollow, molded flexible ribs 293. In this embodiment, each flexible rib 293 is formed in the shape of a semicircular tube and is hollow with an air-filled interior. The flexible ribs 293 run parallel to each other and are oriented perpendicular to the toe-to-heel direction of the outsole 100. Referring briefly to Figs. 2 and 3, the hollow interiors of the flexible ribs 293 form a series of parallel grooves 207. In one embodiment, each of the flexible ribs 293 has a diameter of 4.5 millimeters, and are separated one from another by a distance of 0.5 millimeter (i.e., the ribs 293 are not in contact with each other). In this embodiment, the hollow interior grooves 207 within the flexible ribs 293 have a depth of 1.5 millimeter. The flexible ribs 293 provide cushioning and grip, and promote flexibility of the entire shoe, which in turn promotes a natural barefoot stepping motion, conducive to natural foot health.

Fig. 2 illustrates a top view of the outsole 100 of Fig. 1, according to one embodiment of the invention. In this illustrative embodiment, the frame portion 120 forms a peripheral edge around a cushioning material layer 470, which comprises ball-strike insert cushioning portion 270 and heel-strike insert cushioning portion 280. The top surface of the cushioning material layer 470 comprises a plurality of concave, hollow circles 205, each of which is centered over a module 276 (not shown) located on the bottom surface (not shown) of insert cushioning portion 270 or of insert cushioning portion 280. In this embodiment, the concave circles 205 are connected by a honeycomb grid of small, hollow grooves 209. Insert cushioning portion 270 also includes the parallel grooves 207 positioned above the flexible ribs 293 (not shown). In one embodiment, the concave circles 205 have a diameter of 5.5 millimeter, and the honeycomb grid grooves 209 have a depth of 1 millimeter and a width of 1 millimeter. In this embodiment, the grooves 207 have a diameter of 1.5 millimeter.

Fig. 3 shows a cross-section of outsole 100 attached to an insole board 505. In this illustrative embodiment, ball-strike insert cushioning portion 270 includes flexible ribs 293 and several modules 276. In this embodiment, cushioning insert portions 270 and 280 are integral parts of the cushioning material layer 470 that runs the length of the outsole 100. In this embodiment, for example, a thin strip of the cushioning material layer 470 runs across the top of the arch area 240 of the frame portion 120 and connects insert cushioning portions 270 and 280. In this embodiment, the insert cushioning portions 270, 280 may have a tread thickness of, e.g., 5 millimeters. It should be noted that the measurements given in this embodiment are for illustrative purposes. The insole board 505 may be of a conventional construction.

In the illustrative embodiment of Fig. 3, the surfaces of insert cushioning portions 270, 280 are slightly recessed such that the tops of modules 276 and the tops of flexible ribs 293 are

approximately flush with the bottom surface of the frame portion 120. The recessed configuration of the insert cushioning portions 270, 280 shown in this embodiment may contribute to the overall stability of a shoe by assuring that a substantial part of the bottom surface of the outsole 100 contacts the ground and provides a stable platform when, for example, the child walks on an irregular surface or steps on a small object. The air pockets formed between the modules in the recessed configuration also contribute a cushioning effect in addition to the cushioning provided by the modules themselves.

In accordance with a second aspect of the invention, a shoe is provided comprising an upper, an insole board and an outsole, the outsole having one or more attributes described above. Fig. 4 illustrates a child's shoe 600 comprising an upper 610, an insole board 505 and outsole 100, in accordance with one embodiment. The upper 610 and the insole board 505 may be of a conventional construction. In various alternative embodiments, the outsole may be included in, for example, shoes for infants, and also in shoes for children up to eight years of age.

The foregoing merely illustrates the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise numerous other arrangements which embody the principles of the invention and are thus within its spirit and scope.